Designation: D 2512 – 95 (Reapproved 2002)

Standard Test Method for Compatibility of Materials with Liquid Oxygen (Impact Sensitivity Threshold and Pass-Fail Techniques)[1]

This standard is issued under the fixed designation D 2512; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This method[2,3,4] covers the determination of compatibility and relative sensitivity of materials with liquid oxygen under impact energy using the Army Ballistic Missile Agency (ABMA)-type impact tester. Materials that are impact-sensitive with liquid oxygen are generally also sensitive to reaction by other forms of energy in the presence of oxygen.

1.2 *This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.*

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 145 Specification for Solid Load-Bearing Concrete Masonry Units[5]

D 1193 Specification for Reagent Water[6]

2.2 *Military Standards:*

MIL-D-16791G Detergent, General Purpose (Liquid, Nonionic)[7]

MIL-P-27401C Propellant Pressurizing Agent, Nitrogen[7]

MIL-PRF-25508F Propellant, Oxygen[7]

MIL-T-27602B Trichloroethylene, Oxygen Propellant Compatible[8]

MIL-C-81302D Cleaning Compound, Solvent, Trichlorotrifluorocarbon[7]

3. Summary of Test Method

3.1 A sample of the test material is placed in a specimen cup, precooled and covered with liquid oxygen, and placed in the cup holder located in the anvil region assembly of the impact tester. A precooled striker pin is then centered in the cup. The plummet is dropped from selected heights onto the pin, which transmits the energy to the test specimen. Observation for any reaction is made and the liquid oxygen impact sensitivity of the test material is noted. Drop tests are continued using a fresh specimen cup and striker pin for each drop, until the threshold valve is achieved. A series of drop tests are conducted at an energy level of 98 J (72 ft·lbf) or as specified for the pass-fail tests.

4. Significance and Use

4.1 When this test method is used to measure the threshold impact sensitivity of a material, a relative sensitivity assessment is obtained which permits the ranking of materials.

4.2 This test method may also be used for acceptance-testing materials for use in liquid oxygen systems. Twenty separate samples of the material submerged in liquid oxygen are subjected to 98 J (72 ft·lbf) or as specified. Impact energy delivered through a 12.7-mm (½-in.) diameter contact. More than one indication of sensitivity is cause for immediate rejection. A single explosion, flash, or other indication of

[1] This test method is under the jurisdiction of ASTM Committee G04 on Compatibility and Sensitivity of Materials in Oxygen Enriched Atmospheres and is the direct responsibility of Subcommittee G04.01 on Test Methods.

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[2] "NASA Handbook 8060. 1B, Ambient LOX Mechanical Impact Screening Test," September 1981, pp. 4-53 through 4-71. "Oxygen Systems." George C. Marshall Space Flight Center, National Aeronautics and Space Administration. *Specification MSFC 106B.* September 1981.

[3] "Lubrication and Related Research and Test Method Development for Aviation Propulsion Systems." *Technical Report No. 59-726.* Wright Air Development Division, January 1960.

[4] "General Safety Precautions for Missile Liquid Propellants."

[5] *Annual Book of ASTM Standards,* Vol 04.05.

[6] *Annual Book of ASTM Standards,* Vol 11.01.

[7] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, Attn: NPODS.

[8] Cancelled in 1983. Previously available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, Attn: NPODS.

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